

Early Influences on Mammary Gland Development, with Suzanne Fenton

Studies are showing a trend of girls developing breasts and going through puberty earlier than they did in years past. Now researchers are investigating the role environmental exposures may play in this trend and the potential long-term health effects of earlier development. In this podcast, host Ashley Ahearn discusses with researcher Suzanne Fenton how research on environmental exposures and mammary gland development in rodents might be used to assess risks for humans.

Ashley Ahearn

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It's *The Researcher's Perspective*. I'm Ashley Ahearn.

Girls are developing breasts and going through puberty earlier than they did in the past. For example, one 2010 study showed that white non-Hispanic girls were twice as likely to have begun puberty by ages 7 or 8 than girls at that same age who participated in a 1997 study.¹ Some researchers are investigating the role environmental exposures may play in this trend and what the potential long-term effects might be.

Animal studies are one way they are doing this. Some of these studies have shown that exposure to certain types of chemicals early in life affects mammary gland development and could potentially increase the risk of mammary tumors later in life.²

Researcher Suzanne Fenton leads the Reproductive Endocrinology Group at the National Institute of Environmental Health Sciences. She coauthored a review in *EHP*³ about research on environmental exposures and mammary gland development in rodents, and how this research might be used to assess chemical risks for humans.

Dr. Fenton, thanks for joining me.

FENTON: It's a pleasure, Ashley. Thank you.

AHEARN: Why don't you start by telling me about your findings using rodents.

FENTON: My laboratory mainly focuses on the effects of endocrine-disrupting chemicals on mammary gland development and how that may be the basis for lifelong health effects such as lactation and the ability to lactate and nurse offspring and susceptibility to tumor formation during adulthood. Over the last 10 years we have reported on five different chemicals⁴ that have affected mammary gland development. Some accelerate development, some delay development, but we have several more in the queue that we're evaluating. But we need to do more.

AHEARN: Why study rodents? Are they a good model for human impacts?

FENTON: Yes, rodents are a good model for developmental effects in the mammary gland. There haven't been very many chemicals evaluated for effects on the mammary gland. There are about 85,000-plus chemicals on the open market, but only a fraction of those, maybe 1–2%, have been evaluated for their effects on health in general, and probably only about four dozen of them have been evaluated for mammary gland effects.

One of the things that's a little frustrating about using the rodent model for human health is that regulators may not always pay attention to things that we think are very important. Biologists and toxicologists in my field, for instance, for many years have called the effects in the mammary gland either a "delay in development" or "accelerated development," and I think this has been a mistake. If we call it a "delay," that means that it's something you can recover from, possibly. And we don't mean it in that way, so essentially we need to call it a "developmental abnormality," because maybe we haven't made it clear enough that if a tissue is delayed in development to the point that lactation is interfered with or an animal is made more susceptible to tumor development, that this really is in fact abnormal.

AHEARN: Let's talk about trends in human breast development. Why are girls developing breasts earlier? Is it just chemical exposure?

FENTON: Well, there are studies ongoing now that are following girls over long periods of time. Some of the more recent articles are showing that BMI [body mass index] or obesity plays some role.^{1,5,6} So it's been estimated as high as 30% of precocious puberty may be attributed to increased BMI,⁷ but, you know, the rest is all environment and genetic interaction. We don't really have the answer yet, but there is evidence that environmental chemicals play a role in altering pubertal timing.

Many of the environmental chemicals that girls are exposed to today, they don't even know they're being exposed to. The CDC performs the NHANES,⁸ a national health report, that contains information from people across the United States in terms of what they are exposed to, what's in their blood. But they haven't been able to receive enough funding or [to] sample to be able to evaluate the compounds that children are exposed to. It would be very valuable to have that information so that we can understand what's most important to study, possibly, but we don't have that information.

AHEARN: Dr. Fenton, these young women that are developing abnormally. Do we know what happens down the line? Are they more likely to develop breast cancer or have problems with lactation?

FENTON: Well, there are a couple of studies that have shown a correlation or an association between early puberty and increased breast cancer risk,^{9,10} so yes, there is a correlation. Lactational effects are seldom evaluated in women because we can easily supplement with formula, so if there are effects on lactation we may miss them. This is especially true for women who really want to breastfeed and can't. I mean, we don't know if environment plays a role in their ability to not be able to breastfeed their child.

AHEARN: How much of this is genetic? I mean, some women and some families just develop earlier than others.

FENTON: I can't exactly answer that question, but genetics is a component of precocious puberty. But we do know, because of several studies that have been

conducted, that the environment does have a role in all of this. It's probably the gene–environment interactions that are most important. This is an ongoing area of research right now.

AHEARN: Dr. Fenton, do you have daughters?

FENTON: I have a daughter, yes.

AHEARN: How do you talk to her about your research?

FENTON: I talk to her much like I would talk to an adult. As a toxicologist raising her I was very careful about what she was exposed to. She was one of the children who didn't get to wear nail polish or smelly body creams because I didn't allow her to. But the one thing we can't control necessarily is what's in their diet.

AHEARN: Dr. Fenton, thanks so much.

FENTON: Thank you, Ashley.

Suzanne Fenton leads the Reproductive Endocrinology Group at the National Institute of Environmental Health Sciences.

And that's *The Researcher's Perspective*. I'm Ashley Ahearn. Thanks for downloading!

References & Notes

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- ⁴ The five chemicals studied are dioxin, atrazine, nonylphenol, perfluorooctanoic acid, and brominated flame retardants.
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- ⁷ Unpublished data.
- ⁸ CDC. Fourth National Report on Human Exposure to Environmental Chemicals. Atlanta, GA:Centers for Disease Control and Prevention, U.S. Department of Health and Human Services (2009). Available: <http://tinyurl.com/q8xbjn> [accessed 13 September 2011].
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- ¹⁰ Kelsey JL, Horn-Ross PL. Breast cancer: magnitude of the problem and descriptive epidemiology. *Epidemiol Rev* 15(1):7-16 (1993); PMID: 8405214.

Ashley Ahearn, host of *The Researcher's Perspective*, has been a producer and reporter for National Public Radio and an Annenberg Fellow at the University of Southern California specializing in science journalism.